




This inspiring series on 'Scientists of the World' has been specially planned for children. Young readers will find that science is fascinating and that it has made the world a far better place to live in.

A special feature of the series is that it highlights each scientist's childhood. Young readers will see quite vividly that the great scientists had once been children like themselves and that if their natural curiosity as children can be combined with perseverance, they may also be able to achieve what these people did.

Little Vikram was always interested in the lives of scientists. Their work was even more interesting. But what experiments did he conduct on the top of the Himalayas?

Amrita Patel worked with Indian Metals and Ferro Alloys. Her love of science led her to an M.Sc. degree in Physics.

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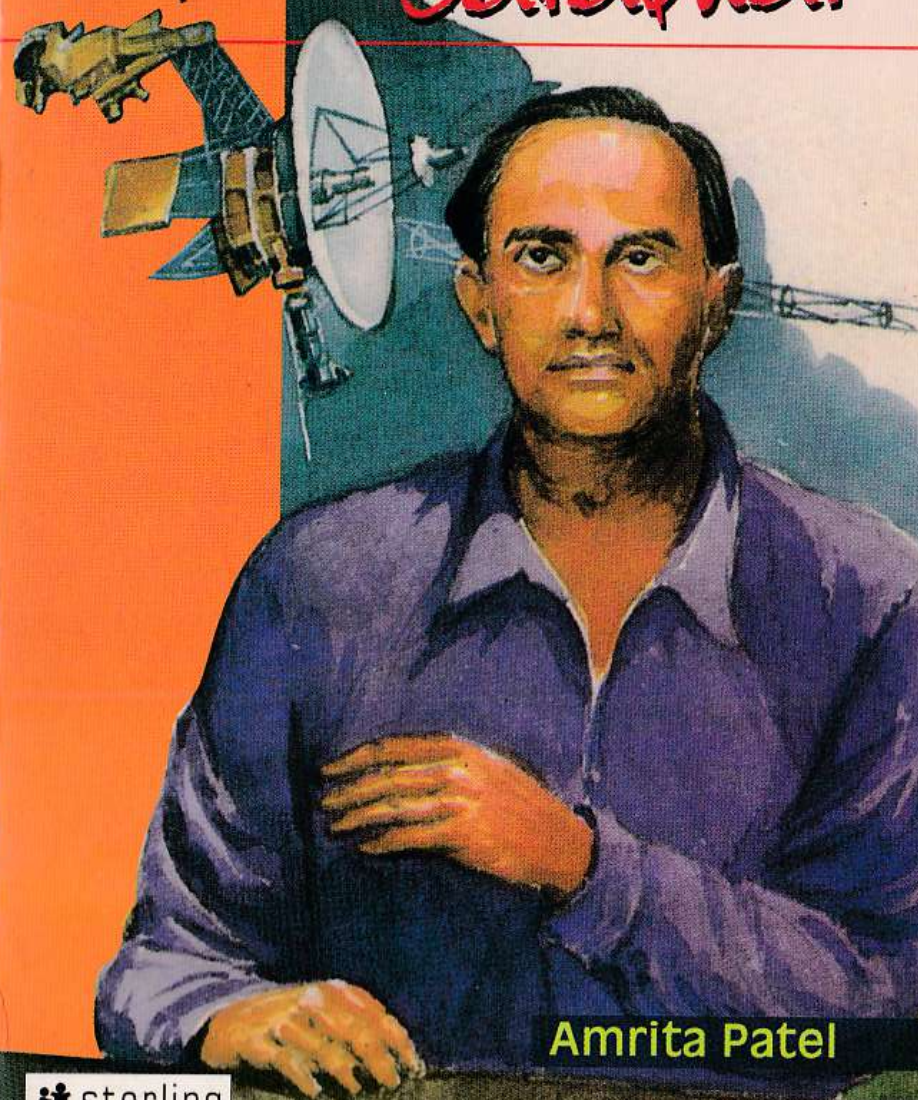
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Scientists of the World

Vikram Sarabhai

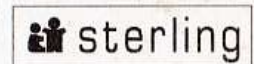


Amrita Patel

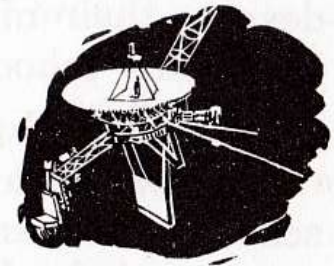
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Scientist of the World
Vikram Sarabhai

Amrita Patel



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Early years

Vikram Sarabhai was born on August 12th, 1919 at Ahmedabad. His parents belonged to a family of rich businessmen. They devoted their time and money to social work. They loved to help the poor and the needy. The Sarabhais gave importance to education too. They had started a school called 'Retreat' for small children. This was a very unique school, for here, children were treated in a special way. Books were not the only thing given importance to. The children were given many toys and games to

develop their minds. The young ones loved this school. The teachers were kind and loving.

This was where Vikram started his schooling. Vikram showed his brilliance even as a baby. He could remember the alphabet, the numbers, and nursery rhymes without any effort. His teachers were impressed. They told Vikram's parents that he would make them proud of him. His parents were very happy on hearing this.

Vikram then joined High School. When he started studying science, he was fascinated. Science was like a mystery to him. He too wanted to discover things. As a young boy, instead of reading story books, he read about the lives of great scientists. He could spend hours trying to conduct some experiment, or just thinking about science.

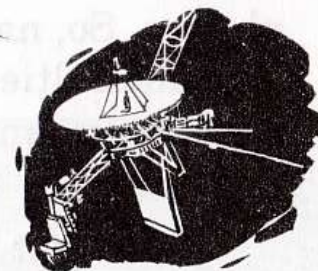
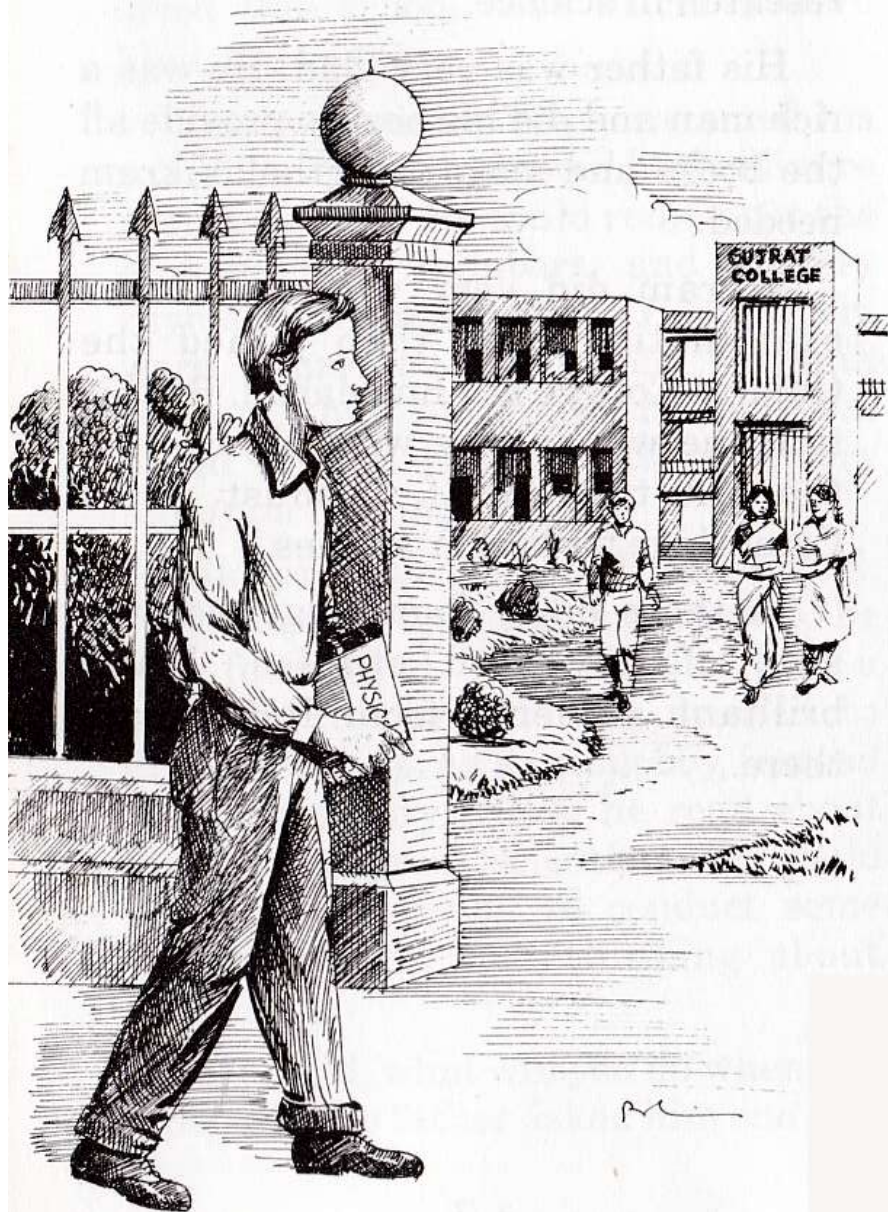
"My child, what will you do when you grow up?" his father asked him one day.

Vikram replied, "I would like to do research in science."

His father was very glad. He was a rich man and did his best to provide all the books and magazines that Vikram needed.

Vikram did very well in all the examinations. He then joined the Gujarat College at Ahmedabad. By this time, he was in love with physics. He thought to himself, 'I must go to Cambridge for higher studies.'

In those days, Cambridge was the seat of advanced studies. Many brilliant students from India went there.



Off to England

Vikram left for England in 1937, and joined St. John's College. At the age of twenty, he got his degree in physics and mathematics.

In England, Vikram got to know about the development of physics, and the latest happenings in science. He never missed an opportunity to read about scientific discoveries and inventions. There was hardly a topic in physics which Vikram did not know. So, many of his classmates went to him with their problems. Even at this young age, he had a deep understanding of

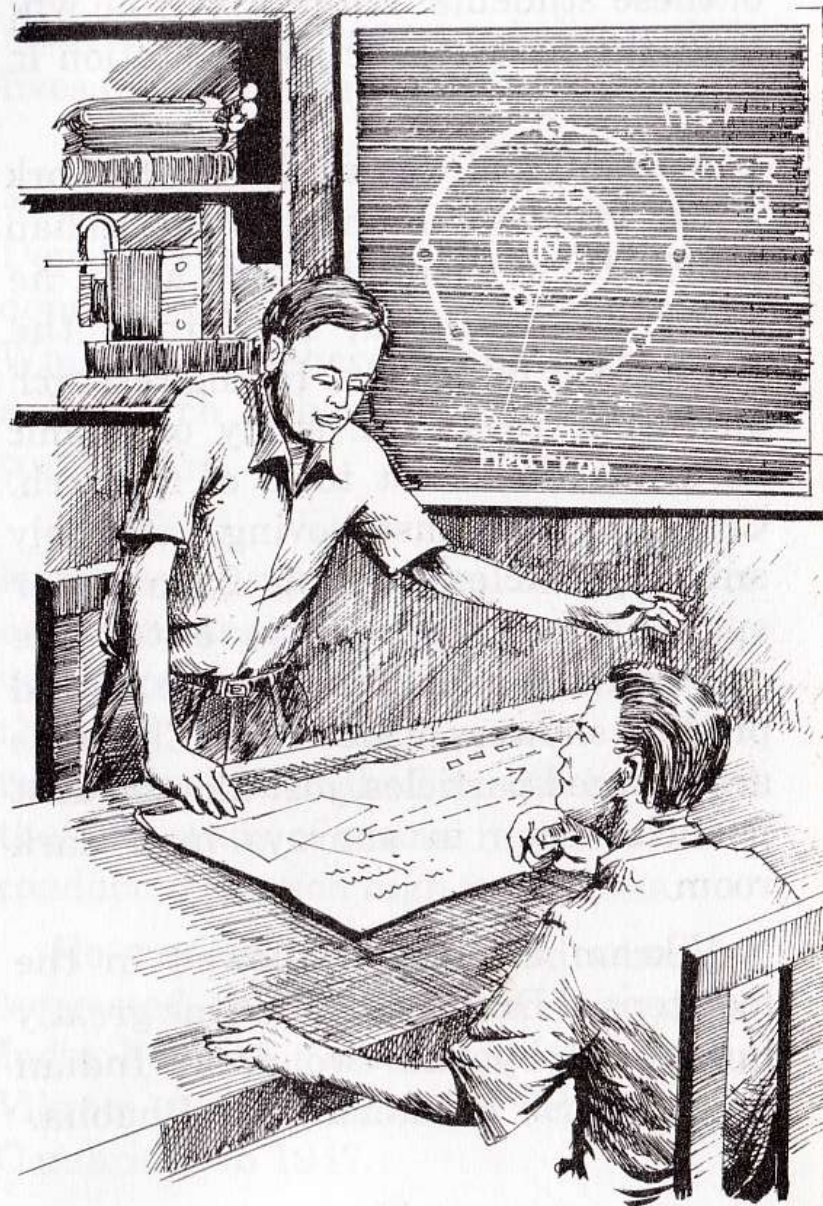
physics. So, naturally, he could explain the difficulties and problems to his friends in an interesting and clear manner.

"You ought to become our teacher!" they said appreciating his skill.

"I still have much more to learn," Vikram smiled, and replied.

In the summer of 1940, the Second World War broke out. Europe was in chaos. Hitler, the leader of Germany, had terrorised the whole world.

During this time, Vikram left England and returned to India. In those days, the Indian Institute of Science at Bangalore was one of the leading research institutions of India. Sir C.V. Raman was its Director then. Professor Raman had won the Nobel Prize for physics in 1930. His fame as a scientist, as well as a teacher was known all over India. Many bright and intelligent students did research under him.



Dr. Homi Bhabha was the most famous of these students. Later, it was he who built the first atomic power station in India.

Vikram, too, was very keen to work under Professor Raman at the Indian Institute of Science. So, after he returned to India, he joined the Institute at Bangalore. He did research on cosmic rays. The study of cosmic rays was the latest topic of research. Cosmic rays are fast moving, extremely small particles coming from outer space. When these rays enter the earth's atmosphere, they hit the air and produce showers of electrons. Electrons are charged particles, just like the dust particles seen in sunrays in a dark room.

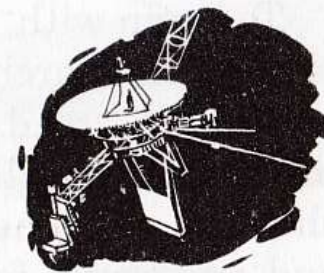
Vikram Sarabhai followed in the footsteps of Dr. Bhabha. He was greatly influenced by the two great Indian scientists, Sir Raman and Dr. Bhabha.

Like them, he was keen on building a modern India. Great men dedicate their lives to a cause and work hard for it.

Two years later, in 1942, Sarabhai worked at the Meteorological Department at Poona. Here, studies are done on the weather and its behaviour. While working here, Vikram dreamt of a Research Laboratory for studies in cosmic rays.

In 1943, Vikram went up the Himalaya mountains to conduct experiments on cosmic rays. This trip was of great importance to him. He was thrilled with the beauty of the mountains. It flashed across his mind that the study of cosmic rays should be conducted on such high mountains.

He was only 24 years old when he suggested this to the Government of India. For all his studies on cosmic rays, Vikram got his doctorate degree from Cambridge in 1947.



Physical Research Laboratory

The dream of setting up a research laboratory for cosmic rays stayed with Vikram. After obtaining a doctorate degree, he set out to make his dream come true. He spoke to many people about a place to start the laboratory. Everybody was very impressed by Dr. Sarabhai's proposal. Some prominent men of Ahmedabad finally agreed to help. They told Vikram that some rooms at the Science Institute would be available to him.

Vikram was very happy. At last his project had taken off.

To begin with, there were only three or four research scholars, an office assistant, and a carpenter-cum-mechanic. Initially, there was an acute shortage of money to buy equipments and apparatus for the laboratory. But slowly, people from far and near came to know about Dr. Sarabhai's efforts. As a result, funds poured in.

Finally, the day arrived when the foundation stone of the laboratory's own building was to be laid. It was February 1952 when Sir Raman laid the foundation stone. On this happy occasion, Raman said, "Vikram's efforts in the path of scientific development is indeed praiseworthy. We must all give him our support and help."

Dr. Sarabhai worked day and night to complete the building, and on April 1954, the laboratory was ready. It was inaugurated by India's first Prime Minister, Jawaharlal Nehru. The laboratory was named the 'Physical



Research Laboratory'. Today it is recognised as a premier research institute. All this was made possible due to Vikram Sarabhai's ability and hard work.

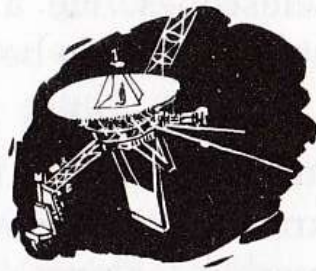
Dr. Sarabhai loved to work in this laboratory. However busy he would be in administrative work, he always found time to do important scientific research in the field of cosmic rays.

But the idea of setting up a research station in the Himalayas was alive in his mind. In 1955, the Physical Research Laboratory set up a research station at Gulmarg in Kashmir. It was the first of its kind in India. Later, the Government also set up a research laboratory at Gulmarg.

The work of the scientists at the research laboratory in Ahmedabad was very difficult. Dr. Sarabhai, along with his students, made accurate observations on cosmic rays using

telescopes. He always encouraged his students to do better than their best.

Dr. Sarabhai had a very analytical mind. Curiosity is the key to knowledge. He was never satisfied by merely looking at the observations on data. He went deep into the meaning of the numbers. His desire to study the subject in depth, helped him to have a clear understanding of the physics of outer space.



Outer space

As time went by, Dr. Sarabhai became interested in the study of space. Even though it was a relatively new field of research in India, Dr. Sarabhai made sure that the team at the Physical Research Laboratory at Ahmedabad never lagged behind.

All the latest science magazines and journals were made available to the research workers. Dr. Sarabhai wanted them to be the best in the world. He sent some of the students abroad so that they could take part in the experiments done there, and learn from the other scientists they met.

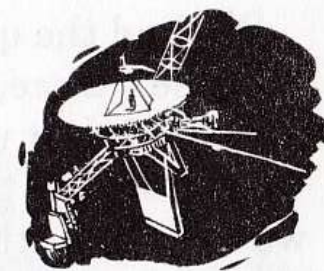
As the years rolled by, the Research Laboratory became the centre of learning of advanced topics like space physics, plasma physics and other such new subjects.

When you sow a seed, you have to take good care of it, water it regularly, and enrich it with manure so that the seed will grow into a healthy tree one day.

Just as a sapling has to be watered regularly so that it will grow into a healthy tree, so too Dr. Sarabhai treated the research lab with much care. The whole of India got to know about Dr. Sarabhai and his laboratory. Dedicated and serious students came to do research under him.

All this fame made Dr. Sarabhai very happy and pleased. But he was not satisfied with just this. He had a very innovative mind. He was constantly searching for new fields of knowledge.

Under Vikram's guidance, the research group at the Research Laboratory became famous at the international level. There were many international committees on space physics and cosmic rays, and Vikram was a member of all such committees. The Physical Research Lab was now the centre of India's space studies.



Vikram as a teacher

The training of research scholars was an important part of the Physical Research Laboratory. Dr. Sarabhai loved his students. He wanted them to excel in their field.

Often, he would sit down with them and discuss their problems. This was a common sight at a coffee shop or in the airport lounge.

The students, in turn, worshipped him. Anyone who came in contact with Dr. Sarabhai was impressed by his knowledge, his brilliance and his simplicity.

He had the quality of putting people at ease. Once, one of his research scholars burnt up an electric meter. He was so scared that when Dr. Sarabhai walked into the laboratory, he was extremely quiet. Sarabhai was puzzled.

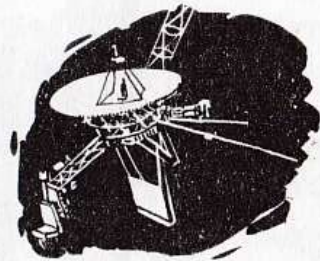
“What is the matter? Why are you so silent?”

“Sir, I’m sorry. The meter is burnt up.”

Dr. Sarabhai smiled, and said, “Don’t worry. We’ll buy another one. How else would you learn? Next time I’m sure you’ll be more careful.”

The student was overwhelmed.





Vikram, the industrialist

Dr. Sarabhai belonged to a family of businessmen. So, even though he was a scientist, he devoted a lot of his time and energy to industry.

Sarabhai set up 'Sarabhai Chemicals', a factory at Ahmedabad. He was one of the leaders in the pharmaceutical industry in India. This industry makes medicines and chemicals.

Dr. Sarabhai was a practical man. He knew the importance of industry. Industry gives employment to thousands of workers, produces goods

that are sold, and brings in money. Money is necessary to meet our expenses. For a developing country like India, industrial growth is very necessary.

After independence, the Indian industry was not in good shape. There were few factories, and India had to get many of its essential items from abroad. Dr. Sarabhai's foresight, views, and ideas came at the right time. He always said, "We must avail of what foreign countries have to offer us — never forgetting our culture."

Dr. Sarabhai encouraged people from industry to go abroad, to get the best training. He also invited many foreign companies to set up industries in India along with the Indian companies.

Dr. Sarabhai is probably the only scientist of independent India who has contributed immensely to the Indian

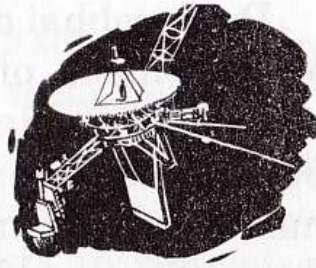
industry. He utilised his scientific brain to make the industrial scene better.

In any work, quality is the most important factor. Dr. Sarabhai was one of the first industrialists to recognise that in industry quality is of great importance.

Another important aspect of industry to which Dr. Sarabhai contributed is Research and Development (R&D). R&D in factories is conducted to improve the quality of a product or make a new product.

With the invention of computers, all the top companies in the world used computers to keep records. Instead of keeping many files and papers, information was stored in a computer. This work is known as Electronic Data Processing (EDP). EDP has changed the way offices work. Dr. Sarabhai was the first to introduce EDP in the pharmaceutical industry in India.

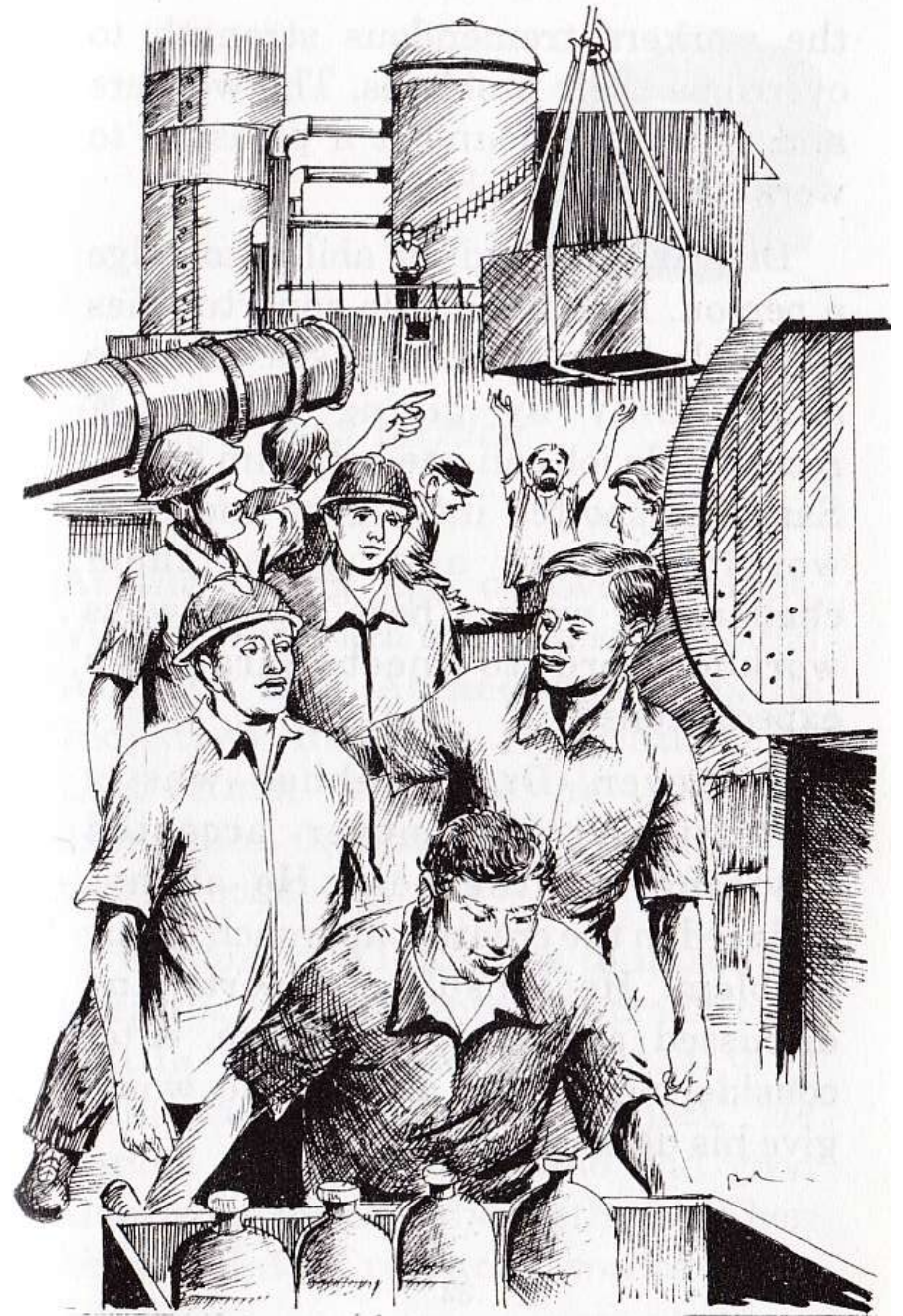
Dr. Sarabhai did a lot of work for the advancement of the pharmaceutical industry in India. He suggested that to be self-sufficient, one has to also manufacture small equipments and drugs. Being self-sufficient means to be able to fend for oneself without depending on others.



Vikram Sarabhai—the ideal manager

Dr. Sarabhai was as ideal manager. He believed that employers and employees have to interact freely if industry is to succeed.

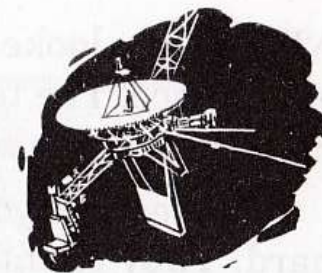
The traditional businessmen never talked to the factory workers and never trusted them. But at 'Sarabhai Chemicals', the atmosphere was totally different. All the employees of 'Sarabhai Chemicals' who worked with Dr. Sarabhai remember him fondly. His pleasant personality was a source of inspiration to all. Even in the middle of grave problems, his warm smile gave



the workers tremendous strength to overcome their problems. The workers and executives found it a pleasure to work with Dr. Sarabhai.

Dr. Sarabhai had the ability to judge a person. He gave ample opportunities to people to prove themselves. He once said, "Only by giving a man a responsible job can one help him grow." Sarabhai spotted intelligent and hard working men, and gave them challenging work. These men always worked hard to meet Sarabhai's expectations.

However, Dr. Sarabhai was a perfectionist. He never accepted anything but the best. He always believed in the creative approach to any problem. He consulted experts and discussed problems with them. After considering all the aspects, he would give his decision.



ATIRA—and textiles

At the young age of twenty-eight, Vikram was asked to organise and build ATIRA, the Ahmedabad Textile Industry's Research Association. At that time, he had no working experience in textiles or training in textile technology.

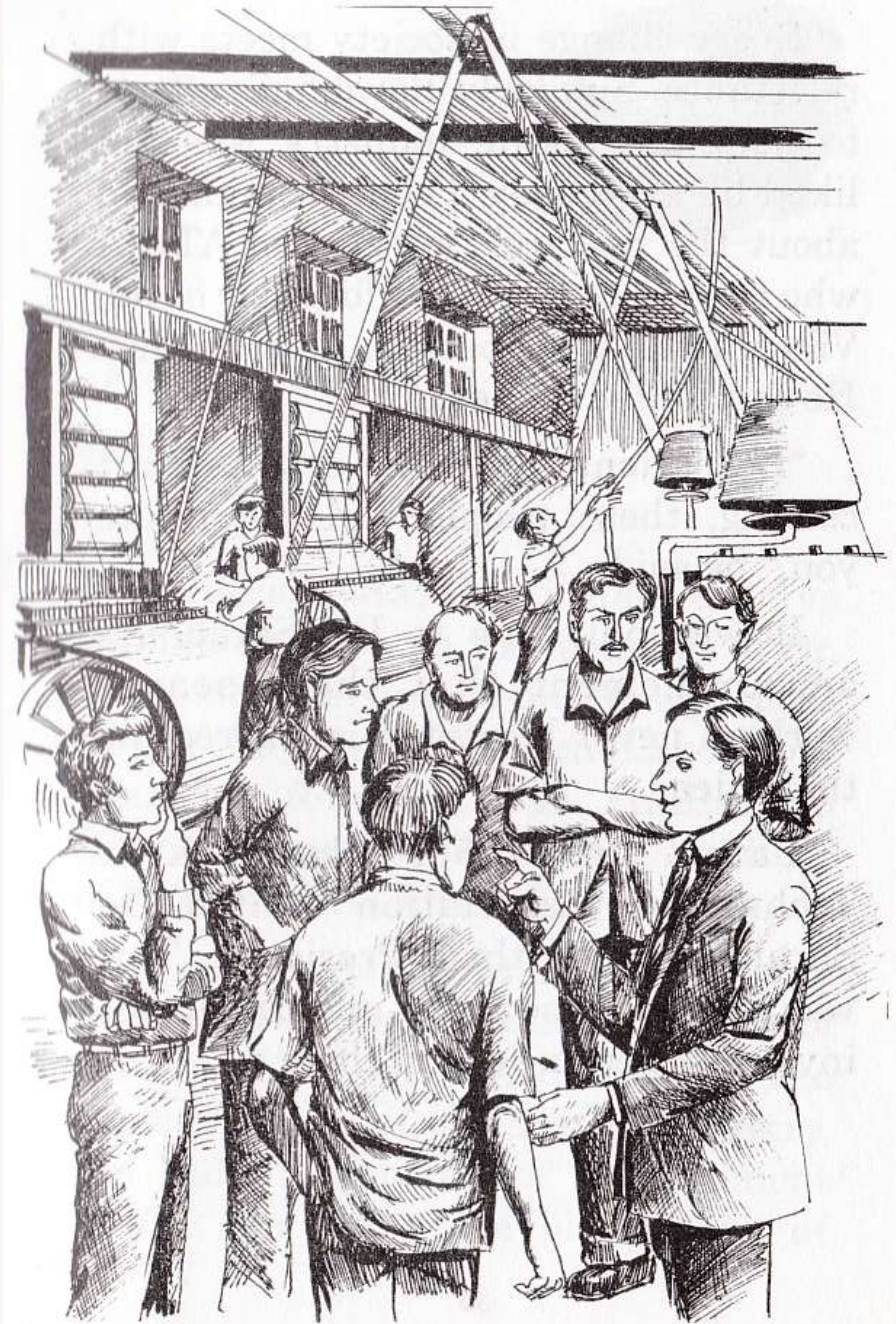
The aim of ATIRA was to introduce scientific methods into the traditional textile industry. Vikram was very enthusiastic about the project. He wanted to hire people who had good knowledge of scientific methods. When he appointed research workers for

ATIRA, he looked for knowledge, not experience. The team that Vikram built had people who were in their thirties.

This team of young scientists worked hard. They spent hours experimenting and discussing problems. Their aim was to modernise the textile industries.

In a short span of three years, ATIRA began to play an important role in industry. At that time, there was no quality control in factories, nor training programmes for the factory workers. There was no dialogue between the workers and the owners. There was also a big communication gap between the scientists and industry. The businessmen did not know about the latest scientific methods which could help them.

All these problems were taken care of by ATIRA. Sarabhai as the leader helped the various people connected with industry and science to meet and discuss new ideas.

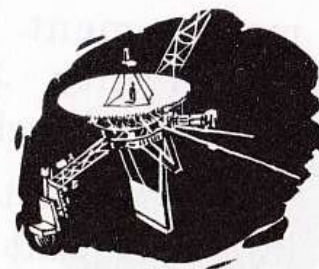


Every change in society meets with resistance. Similarly, Sarabhai's efforts to help the textile industry was not liked by everybody. People complained about the research workers of ATIRA who were getting too big for their boots. Vikram was not upset on hearing this. He counselled his team:

"Be patient. Once the results start coming, these people will appreciate you," he said.

It was only due to Dr. Sarabhai's encouragement that the research workers never hesitated in expressing their ideas.

Later, in 1956, the Textile Technicians Association invited Dr. Sarabhai to be their President. This was the first time that a mill owner was invited to become one of them.



Vikram Sarabhai, the institution builder

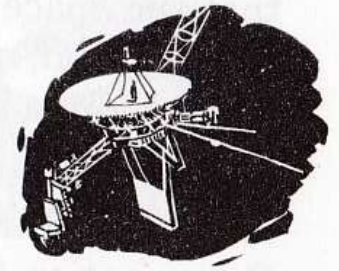
Dr. Vikram Sarabhai had always wanted to follow in the footsteps of Dr. Homi Bhabha, and he did. The purpose of the Physical Research Laboratory that he founded was similar to Bhabha's creation—the Tata Institute of Fundamental Research.

In one respect, Sarabhai went a step ahead of Bhabha. He built a variety of institutions — ATIRA devoted to the modernisation of the textile industry, the Indian Institute of Management (IIM) for the development of

management skills, and the Community Science Centre for popularising science.

For industrial growth, it was important that the people were trained in the latest techniques of industrial management. In 1962, the Indian Institute of Management was set up at Ahmedabad. Dr. Sarabhai was the honorary director. Even today, the IIM at Ahmedabad is considered the best for training in business administration.

The Community Science Centre at Ahmedabad was yet another proof of Dr. Sarabhai's efforts. The Centre organised meetings with eminent scientists for the students and conducted simple courses for laymen. The Centre has a very big library and always buzzes with activity. Science was his first love, and he was keen that each and every man was aware of science. The Community Science Centre was a step in that direction.



Space age comes to India

Dr. Sarabhai ushered in the space age in India. He was inspired by Dr. Homi Bhabha's Atomic Research Establishment at Trombay. Here, studies were done on atomic energy production and its uses.

Space science can help many areas of importance, like communication, education and weather forecast.

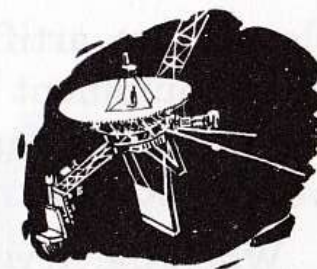
Dr. Sarabhai created the 'Indian Committee on Space Research' in 1969 along these lines. The aim of this committee was to develop space science and technology in India. He realised

that the space age was to be a new era for mankind, and so was determined to make India a leader in this field.

The committee on space science was later named the Indian Space Research Organisation (ISRO), and Dr. Sarabhai was its chairman.

Sarabhai's first achievement was a rocket launching station set up at Thumba. Another feather to his cap was the completion of the second Rocket Range at Sriharikota near Madras. Since then, ISRO has launched a large number of Indian satellites and rockets.

For all his efforts in the development of space science, Dr. Sarabhai was made the Scientific Chairman of the UN Conference on Outerspace in 1968. It was a very prestigious post and a matter of great honour and pride for India.



India's first satellite

The credit for much of what India has achieved in space technology must go to Dr. Sarabhai, though he did not live to see many of the fruits of his labour.

In April 1975, the first Indian built satellite was launched. It was named 'Aryabhata' after the great Indian astronomer and mathematician of ancient times.

What is a satellite?

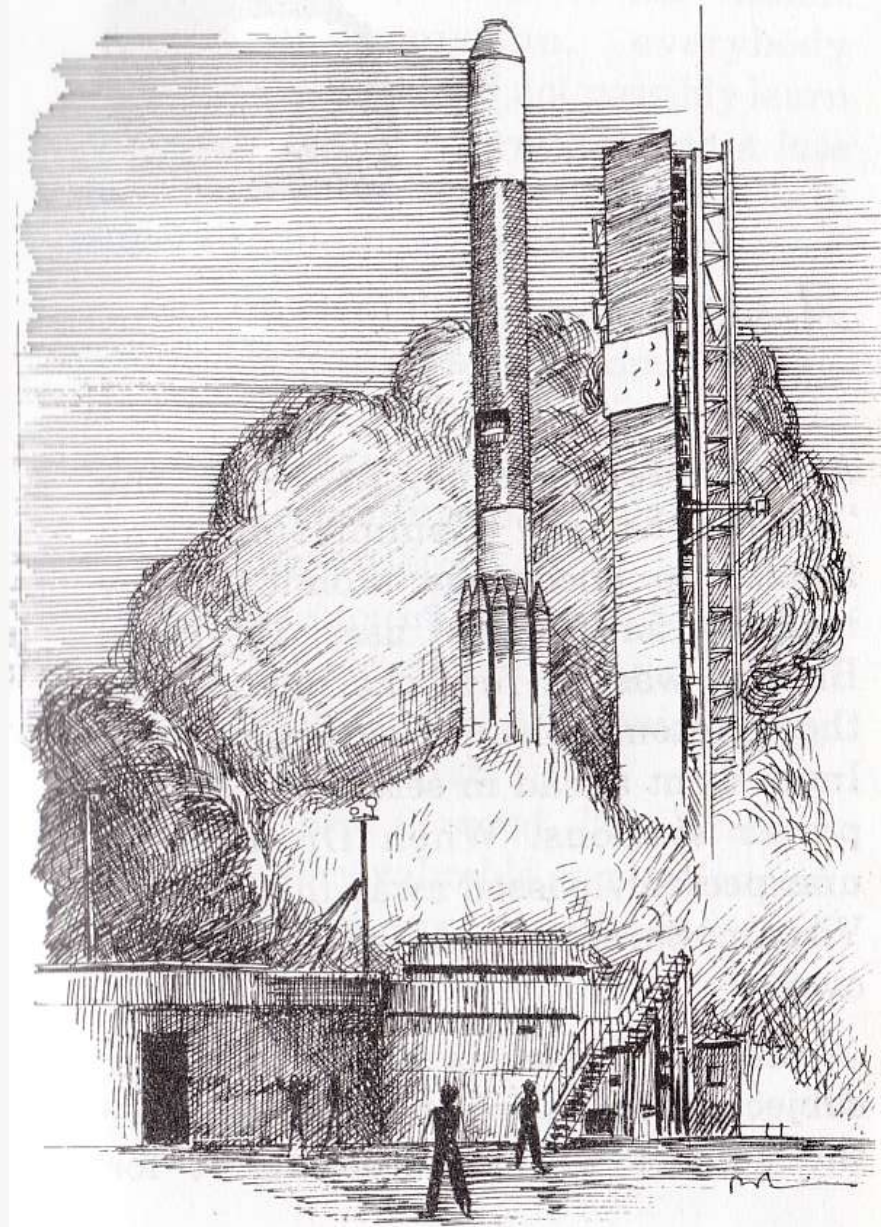
The moon is a satellite of the planet earth. Man-made spacecrafts that go round the earth, the moon, and other

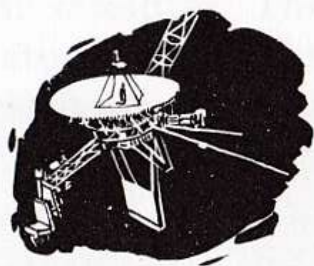
planets are artificial satellites. These carry equipment to study space. These are also used for communication and weather forecasting.

When the Aryabhata was launched, Dr. Sarabhai was not alive to witness the historic occasion. But every step that India takes forward in space studies and technology is due to Dr. Sarabhai's effort.

In 1975-76, ISRO conducted the Satellite Instructional Television Education (SITE). Under this project, development programmes like family planning, adult education and health care were directly telecasted to about 2,400 villages, using an American satellite.

ISRO had signed an agreement for this project way back in 1969. Dr. Sarabhai was totally involved in this project. It was his dream to use satellites and televisions for education.





Atomic energy

After independence, in 1948, the 'Atomic Energy Commission' was formed to encourage atomic energy research for peaceful uses. Dr. Homi Bhabha was its first chairman. Even though atomic physics was a new field, India went ahead in setting up atomic power stations. When Dr. Bhabha unexpectedly passed away in 1966, Dr. Vikram Sarabhai was asked to take over.

Atomic physics is a very complex subject, and it is not possible to master the subject without studying it for

many years. So, when Dr. Sarabhai became the chairman of the Atomic Energy Commission, everybody thought that he could not possibly learn all about atomic energy at such a late age. Perhaps the best he could do was to supervise the duties of the Commission.

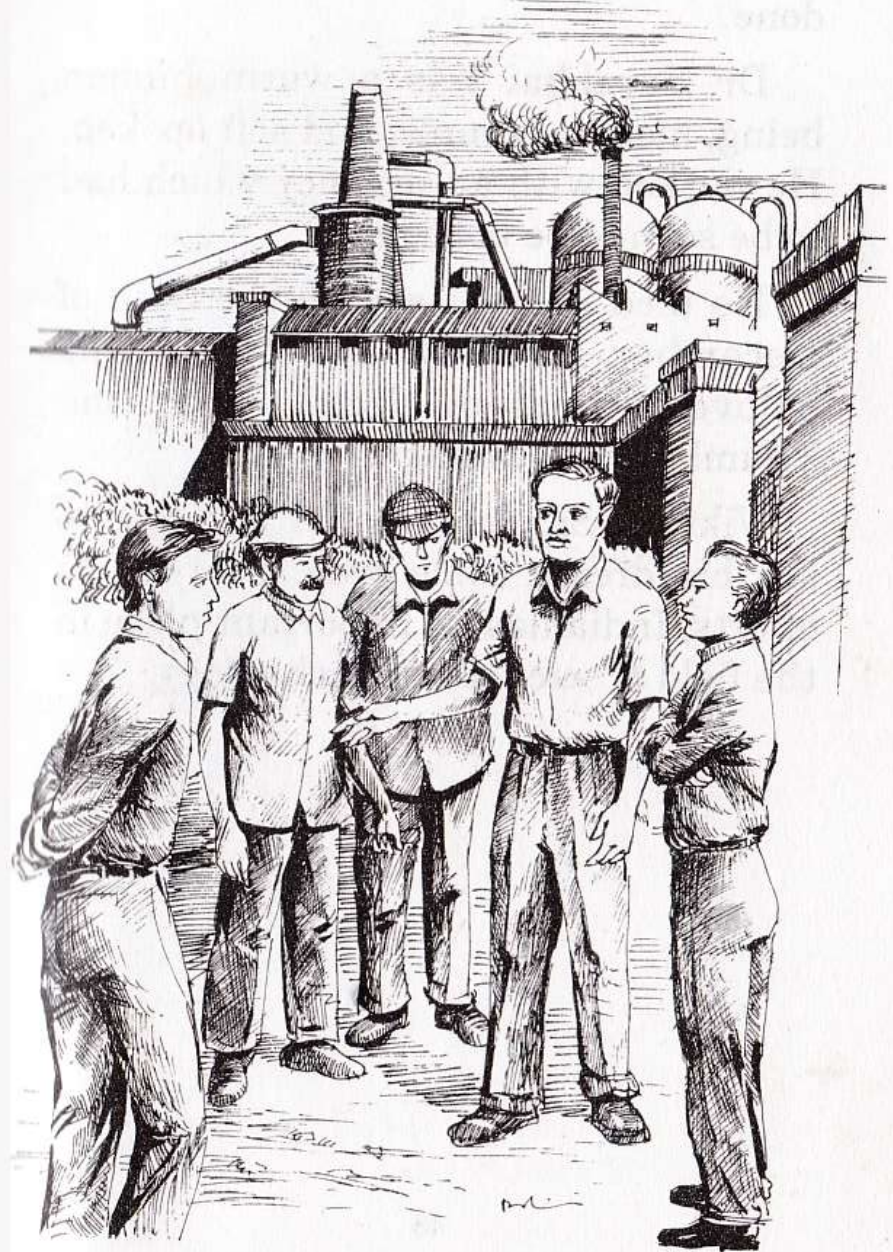
But Dr. Sarabhai proved everybody wrong. He read all about atomic energy. He contacted experts in this field. He was a fast learner too. Because of the excellent training he had received during his student days, he could master the subject within a short span of time. He did not find it difficult to discuss the problems of atomic energy development with the experts. Everybody was amazed. Dr. Sarabhai also made very valuable suggestions on the atomic energy development in India.



Sarabhai—scientist and man

Dr. Sarabhai was a leading personality in the making of the science policy. He said, “No nation can progress if science and technology is not understood or applied by the people. What use is science if it cannot benefit man?”

By 1970, Indian scientists had acquired knowledge on space physics, atomic physics, and satellite communication. But knowledge had to be directed for the benefit of the people. And in this area, Dr. Sarabhai's efforts are indeed praiseworthy. He listed out the major fields in which scientific



research and development should be done.

Dr. Sarabhai was a warm human being, modest, simple, and soft spoken. He worked with an urgency which had to be seen to be believed.

He died in his sleep on the 30th of December, 1971 in a hotel on his beloved Kovalam Beach, near the Thumba Pocket Range.

Vikram Sarabhai could not live to see his dream come true. Due to his efforts, India has an important place in the field of science and technology.